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altitude of the tree.\* A simple measurement of this horizontal, by pacing the distance, or by other means, thus gives the height of the tree.

Fig. 1, front view of the instrument. Fig. 2, vertical section of the same, side view.

Ames, Iowa.

C. E. BESSEY.

### § 35. The Herbaria and Botanical Libraries of the United States. V.

HERBARIUM OF THE ACADEMY OF NATURAL SCIENCES OF PHILADELPHIA.—The Academy of Natural Sciences, of Philadelphia, was founded March 21st, 1812, by a few citizens "interested in the study of the works and laws of the Creator." From the outset, the department of Botany received a due share of attention, and the first contribution to the Academy's Herbarium consisted of a collection of plants made in the environs of Paris and presented by Nicholas S. Parmentier, and still in excellent preservation.

During the years which followed, this little nucleus received constant accretions from the working botanists of the day, and the names of Collins, Elliott, Pursh, Baldwin, Leconte, Conrad, Nuttall, Torrey and Pickering are noted upon many of the early tickets of the Herbarium.

In 1834, the Academy received the bequest of the collections made by Rev. Lewis David Schweinitz during a period of forty years. Most of the North American species were collected by himself, but many came from Dr. Torrey, Major Leconte, Rev. Mr. Dencké, and other correspondents. The European species were contributed by Weldon, Benthams, Brongniart, Schwaegrichen, Steudel and Zeyher. The Siberian plants were furnished by Ledebour, and those of India by Wallich and Steinhauer. Many Chinese species were collected by Mr. James Read; and from the arctic regions were plants collected by the navigator Parry, and received through Sir William Hooker; while from South America were rich collections made by Von Martius, Hufel, Hering and Baldwin. But perhaps the most valuable portion of the bequest consisted of the extensive series of the lower cryptogams, of which Schweinitz had made a special study.

Other valuable contributions followed the bequest of Schweinitz, among which may be specified the Poiteau collection of St. Domingo plants; Chilian plants from Dr. Styles and Dr. Ruschenberger; Nuttall's collections made in his expeditions to Arkansas, Oregon and the Sandwich Islands; Menke's herbarium of 7,000 species of European plants derived from Thunberg, Sprengel, Bernhardt, Treviranus, Mertens, etc.; the Ashmead collection of marine algae; Lesquereux's collection of over 700 species of algae, authenticated by the best algologists of the age, and a large collection of cryptogams from Ravenel.

More recent additions are the herbaria of the late Thomas G. Lea, of Cincinnati, and of Dr. Joseph Carson, late Professor of Materia Medica in the University of Pennsylvania; a large collection from Southern Europe and from India, made by the late John Stuart

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\* The letter *x*, omitted by the engraver, is supposed to be at the point of intersection of the lines *a*, *b* and *c*.

Mill, received from Miss Taylor through the Director of the Kew Gardens, and the kindness of Dr. Gray; the collections of the late Dr. Charles Pickering made in his journeyings through oriental regions in 1844 and 1845; Syrian and Algerian plants from Dr. Geo. E. Post, of Beirut; Floridan plants from Dr. Garber; Mexican plants collected by Parry and Palmer; and a set of the mosses and hepaticae of North America, collected and named by the late Coe F. Austin.

But the most important accession to the Academy's Herbarium is yet to be mentioned. After the death of Dr. Charles W. Short, of Louisville, Ky., in 1863, the splendid collection of American and exotic plants which he had accumulated and arranged in sumptuous manner, became the property of the Academy, on condition that it should be kept distinct and apart, and open to the inspection of botanists, under the name of the "Short Herbarium." For this, the Academy was indebted to the strenuous exertions of Dr. Gray in its behalf, and to the liberality of Dr. Short's family. The plants of this collection are uncommonly choice specimens, from all the active collectors up to 1863, and are laid in sheets of extra size, arranged in 325 book-form cases, of which the North American species occupy 261, and the exotic species 64. Even without the restriction under which this collection was received, there would have been abundant reason for keeping it apart, sacred to the memory of the accomplished botanist who formed it, and to whom Dr. Gray dedicated the rarest and one of the most beautiful of North American genera.\*

The work of arranging the earlier collections of the Academy, was mainly accomplished by Nuttall and Pickering, followed later by Goddard, Bridges, Zantzing, Durand, Burk, Meehan, Redfield and Scribner. Until the removal to the new building, in 1876, the arrangement had been after the Linnaean system, in large cumbersome port-folios, in a narrow, dark and inconvenient hall. The removal gave opportunity for entirely new arrangement, more in accordance with the progress of the science, on enclosed shelves after the most approved modern methods, and in well-lighted apartments convenient for reference and study. The work of mounting the plants upon standard paper has been begun.

In 1854, the lamented Elias Durand began the work of forming a special North American Herbarium from the stores of the Academy, contributing largely from his private collection, of species collected by Lindheimer, Fendler, Wright and others. In this labor he was occupied for four years. Since his death the work of perfecting this department has been continued, and nearly all of the collections made in our newer territories by Parry, Lemmon, Palmer, Kellogg, Ward, Rothrock and others have been contributed at various times by Gray, Canby, Parker, Meehan, Rothrock, Martindale and Redfield. This collection and the "Short Herbarium" occupy the upper of the two rooms devoted to Botany, while the lower room contains the General Herbarium, and a large case devoted to the reception of fruits, seed-vessels and other vegetable productions.

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\*For a tribute to the botanical labors of Dr. Short, and some further account of his herbarium, see Dr. Gray's obituary notice in the *Amer. Journ. Sci.* 2d series, Vol. xxxvi., p. 130, Nov. 1863.

All these collections are now in charge of the Botanical Section of the Academy. Their chief value lies in the large number of species from early collectors, and of type specimens of early authors. Most of Nuttall's early species are deposited here and have been the vouchers used by Torrey and Gray in deciding upon their specific validity. Schweinitz's own types of his new fungi, lichens, etc., are here, as well as many of the types collected by Bigelow and others in the Whipple Exploration, bearing tickets in the beautiful chirography of Dr. Torrey.

So old a collection, much of it running back for sixty or seventy years, might be expected to have suffered from the ravages of insects, and from the crumbling effects of time. Some portions have, indeed, thus suffered, but careful attention and thorough poisoning have kept this destruction within narrow limits. Many of the species from tropical regions have remained undetermined, and are in fragmentary condition. Dependent as the Academy has mainly been, upon volunteer and occasional supervision, it has been impossible fully to determine all new accessions, or even properly to care for the old. All should be carefully worked over, the redundancies sifted out, the hiatuses filled, and the work of mounting carried on to completion. It may be hoped that ere long some public-spirited individual will be incited to make an endowment that shall provide for this and other needed botanical work.

It is always difficult to ascertain the number of species in a large herbarium, and estimates are apt to be excessive. In collections received from many sources, there will of course be a large amount of duplicating. Doubtful, imperfect and undetermined specimens increase the difficulty, and the varying ideas as to the true circumscription of specific limits add another element of doubt. The Academy's Herbarium has been estimated to contain as high as 70,000 species, an estimate made doubtless without proper regard to the large number of species common to the several collections of which it is made up. Recent estimates, based on portions which have been carefully worked over, would give the number as not less than 40,000, nor more than 45,000 species.

In preparing this notice, free use has been made of the history of the Academy's progress and condition, prepared by Dr. Ruschenberger, who has been for nearly fifty years one of its most active members, and for the last eleven years its presiding officer.

J. H. R.

§ 36. **Rooting at the Tips of the Branches.**—According to *Nature* of Dec. 23d, Francis Darwin read a paper before the Linnean Society, Dec. 16th, on "The Theory of the Growth of Cuttings, illustrated by Observations on the Bramble, *Rubus fruticosus*." His experiments indicated that root-budding took place generally at or near the tips or distal ends, rather than at or near the basal ends of the branches, and he evidently deduces therefrom the fact that for the plant it is better that it should perpetuate itself by thus rooting at the tip-ends of the branches. As this is so contrary to the belief and the practice of all horticulturists, I think one should hesitate to